

Exploring Crustal Material from a Mystery Planet

Suggested Grade Level: K – 12

Correlated Topics:

Rocks and Minerals
Geology
Meteorology
Astronomy
Biology

Oceanography, Lakes, and Streams
Volcanism
Sedimentation
Weathering and Erosion
Botany

Objectives:

Students will:

- Observe the characteristics of crustal material samples
- Classify crustal material into groups with similar properties
- Infer causes for the characteristics of the various crustal samples
- Infer the history of the mystery planet

Processes Illustrated:

Questioning
Hypothesizing
Identifying variable
Inferring

Observing
Classifying
Inventing Concepts

Class of Activity: Exploratory: X Application: X Extension: X

Curriculum Connections: Language Arts

National Science Education Standards:

Standard A: Abilities necessary to do scientific inquiry

National Math Education Standards:
NM.5-8.8 Patterns and function

Materials Needed:

- Hand lens
- Toothpicks and/or tweezers
- Small magnets
- Sample “mystery” planet crustal material. Prepare a sample mixture of “typical” crustal material from a rocky planet. The exact composition is not critical, but include as many of the following as possible:
 - Coarse and fine sand from a playground, garden store, river, or beach
 - Small rounded pea-gravel from garden center, stream, or gravel pit

- Small flat “skipper” type rounded pebbles from a rocky lake or ocean beach (the flattening is caused by the motion of the waves at or near the shore)
- Angular crushed stone from a rural road, driveway, or garden center
- Table salt
- Coarse rock salt (sidewalk melting salt or crushed water softener pellets)
- Crushed clinkers from a coal furnace or crushed charcoal briquettes
- Vermiculite or perlite from gardening center
- Small fossil fragments or simulate by breaking shells into ~1-cm fragments
- Small fragments of man-made materials such as plastic or metals (optional)
- Any other rocky planet materials that you can obtain easily
- Metric graph paper to be used as a measuring device (mm or cm grid, as appropriate for the measurement skills of the students)
- Large container, pail, or pan, about 1 – 3 liter capacity (1 – 4 quart)

Procedures:

1. Give each team of two students a sheet of graph paper and a sample of crustal material. Be sure to include both large and small pieces.
2. Have the teams explore and observe as many properties of each kind of substance in the sample as they can, using tweezers, graph paper measurements, magnifying lenses, and magnets. Remind them that they do NOT need to know what each substance is. Instead, lead them to describe the CHARACTERISTICS of the pieces, such as color, shape, size, luster, density, layered, magnetic, etc.
3. Have teams share and discuss their observations.
4. Have students infer the causes for the observed characteristics of the various materials. They might suggest water erosion, life forms, sedimentation and many other processes that cause the observed properties of components in the sample.

Extensions:

1. Have students do research on the processes that create features seen on Earth and relate these to their inference about the mystery materials.
2. Have students write or tell a story about the mystery planet.
3. Have students write a paper about the environment on the mystery planet.

Credits:

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Ready-prepared mystery planet material and other Astronomy and Earth Science materials may be obtained from the author: D. Louis Finsand, Spectrum House, 1501 W. 19th St., Cedar Falls IA 50613.